

as typical, pl. 4, fig. 9, fig. 8, left, has the last whorl closely streaked with rood's brown, cinnamon and pale pinkish buff, the former predominating, crossed by several darker, burnt umber, spiral bands and lines. A band below the suture white. This pattern fades on the penult whorl, leaving the upper part of the spire and the apex white. In some specimens the streaks are more or less diluted, pl. 4, fig. 7, to the point of disappearing, forming transitions to the following. The second main pattern, pl. 4, fig. 6, has a cartridge-buff ground, a sutural band and the spire white; streaks faint or wanting, but there are two dark bands, weakly interrupted, at periphery and on the base; sometimes a third below the subsutural white band. This is much the coloring of *A. spaldingi*.

The columellar fold is rather thin and situated high. The aperture shows the banding vividly within. Outer lip quite thin.

Fig. 9, right. Length 15, diam. 9.6, aperture 7.8 mm.;  $5\frac{3}{4}$  whorls.

Fig. 9, left. Length 15.2, diam. 8.3, aperture 7.7 mm.

Fig. 8, left. Length 14.5, diam. 9.5, aperture 7.9 mm.

Waianae mountains in Haleauau valley, where the trail ascending Kaala leaves the stream. Cotypes in collections A. N. S. Phila., Bishop Museum and W. H. Meinecke.

*A. spaldingi* is quite distinct from the light form of *meinecke* by its texture, dull surface, etc. *A. thaanumi* stands nearer to *lehuiensis* and *meinecke*, the unstreaked pattern of the latter approaching it; yet at present *thaanumi* appears distinct by its coloration and rather solid, smooth shell.

Mr. Meinecke's account of the finding of these shells follows.

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HUNTING ACHATINELLA MEINECKEI AND PARTULINA DUBIA IN THE  
WAIANAE MOUNTAINS, OAHU.

BY WILLIAM H. MEINECKE.<sup>1</sup>

On Dec. 27, 1918, I took a tramp to Mt. Kaala, Oahu, from Schofield Barracks (Leilehua). . . . On the way up, at the first

<sup>1</sup> Letter to H. A. P.

timber, I collected a number of specimens of *Achatinella mustelina* and accidentally found one plain *Partulina dubia*, the first I had ever collected on the north side of the Waianae Range. On Dec. 29, 1918, I returned for more, and found a few plain ones a few yards away from the trail and less than fifty yards from Haleauau stream bed. A scant hundred yards farther up the trail, under the bark and in knot holes of the smooth-leaved lehua trees growing *within arm's reach of the very trail*, I found several fine specimens of dark, banded *P. dubia*, very similar to those which I had found in Waimano Valley, above Pearl City, Koolau Range, in 1913. In spite of careful and persistent hunting, they could be found only within a very small area, less than a hundred feet in extent. They were all within fifteen feet of the ground, most of them not more than five feet off the ground.

I showed them to Mr. Irwin Spalding, who said that they were the most distinctly banded *dubia* he had ever seen; but I think that those which I collected in Waimano Valley, above Pearl City, Koolau Range, in 1913, are more distinctly banded, and in some specimens even darker. At the first opportunity, Jan. 5, 1919, I took Mr. Spalding up to the locality and we managed to find a few more specimens in a knot-hole which I had not searched quite thoroughly. Most likely you have seen those specimens in Mr. Spalding's collection while you were here last summer.

No further visits were made by me till June 13, 1920, when I went alone again and managed to find four more excellent specimens of banded *dubia*, in the same locality. A scant hundred yards above this *dubia* locality and a little farther off the trail—not more than two hundred feet away from the trail on the Haleauau side—I found under the bark on the trunks of the smooth-leaved lehua trees four young specimens of an entirely new variety or species of *Achatinella*. They were all near the ground. I hunted the tree trunks, but the higher I climbed, it seemed, the less luck I had, so I finally settled down to hunting down low. I could not hunt very long then as it was getting late.

Having collected a few *Achatinella spaldingi* (with Mr. Spald-

ing on Jan. 12, 1919) from Pukaloa, the next valley, I noticed their similarity, and thought that I had found a few *A. spaldingi*. I told Mr. Spalding later that I had found a few *A. spaldingi* in Haleauau, but he only laughed and seemed to discredit the find.

Upon my return from Kau, Hawaii, last September, I had the good fortune of meeting my old-time hiking partner and friend, Mr. Daniel B. Langford, whom I am sure you know quite well. I showed him the shells two days before he left here for Japan. On Oct. 9, 1920, I again went out, this time to look particularly for more of the new shells. I could not find any more banded *P. dubia*, but managed to get a few young specimens of the new shell [*Achatinella lehuiensis meinickei*]. As before, these were all found under the bark of the smooth-leaved lehua trees, from within a foot of the ground to about six feet. Some were on the outside, crawling. The higher up the tree I went the less I found and the smaller the specimens. At ten or twelve feet above ground I found none, so I concluded to hunt "off the ground." Here again the shells seemed to be confined to a very small area, not more than a hundred feet across, or possibly 200 ft. Late in the afternoon, there being no other place to hunt (I had hunted every plant in sight, even the Hilo grass), I concluded to try the top of a large lehua tree on which I had found several young specimens. Here I found on the leaves, *at the tip-top of the tree*, some thirty to forty feet above the ground, several large shells which I believe to be adults.

Again on Oct. 31, 1920, I went up the same trail to help the Trail and Mountain Club of Honolulu mark the trail to Kaala with signboards. I put in a good half-hour's hunt of the very same lehua tree gone over two weeks before, and was rewarded by finding over a dozen good specimens of *A. l. meinickei* and several *A. mustelina* on the very same branches, side by side. Being on a tramping trip I had to move on, so I presume that there are at least a few more specimens still to be found.

I kept the specimens alive for one week, then let them drown in water for about twenty hours, after which they were readily removed from their shells. I kept each animal and its shell

separate from the rest and put six of them (those which I could see seemed to have embryonic shells within) in separate vials and numbered the animals and their shells to correspond. The rest I preserved en masse.

Unfortunately I did not keep the animals of the banded *P. dubia*, so I cannot send you any of them. It might be well to note here that the *A. l. meineckeii* seemed to be much darker, even to a purplish appearance in some cases, when alive and after drowning, but appeared very much lighter immediately after the animal was pulled, due no doubt to the color of the animal, as the shells are very thin.

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NOTES ON *CRASPEDOPOMA LUCIDUM*, LOWE AND OTHER MADEIRA  
SNAILS.

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BY T. D. A. COCKERELL.

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In the Madeira Islands there is only one genus of Cyclostomoid shells, *Craspedopoma*. It is represented by four species, all described by Lowe, living to-day only on the main island of Madeira. One of them, *C. lucidum* Lowe, is common to the fossil beds east of Canical, Madeira, and is said to occur fossil on the Southern Desert Island and on Porto Santo. Wollaston is very explicit about the Porto Santo records, citing three localities, and remarking that the specimens are rather small. I could not find any trace of it there, and Mr. A. C. de Noronha and the Rev. Drummond Paterson, who have collected much more extensively, have also failed to find it. Near Canical, in Madeira, it occurs in the well-known beds along with *Plebecula bowditchiana* (Fér.), *Geomitra delphinula* (Lowe) and many other shells. These shells are cited by Wollaston as "subfossil", but they are properly regarded as fossils, and by all available criteria should be Pleistocene, perhaps Lower Pleistocene. Several of the forms are extinct, and the representatives of some of the living species are appreciably different from their descendants. Thus the common *Leptaxis undata* (Lowe), found in quantity fossil, mixed with *P. bowditchiana*, is larger than ordinary living specimens. It may be regarded as a distinct